

main scanning direction moving means for moving a carriage in a main scanning direction, said carriage having said plurality of heads mounted thereon;

paper conveying means for conveying the print paper in a sub-scanning direction;

pattern printing means for printing, with at least one head, a test pattern including predetermined pattern elements;

B1
claim
pattern detecting means, mounted on said carriage, for detecting the pattern elements of the test pattern printed on the print paper by said printing means;

binary conversion means for binarizing an output of said pattern detecting means;

position detecting means for detecting a position of the carriage in said main scanning direction; and

calculating means for moving said carriage to detect the pattern elements of the test pattern with said pattern detecting means, for detecting a print position of the pattern elements based on a detection result of said position detecting means when a rising and/or falling edge of a binary signal obtained by said binary conversion means is generated, and for calculating a mounting deviation amount of each head in said main scanning direction,

wherein said position detecting means comprises low-resolution position detecting means based on a linear scale provided on a movement path of said carriage and high-resolution position detecting means for detecting a position more finely than a minimum unit determined by a resolution of said low-

resolution position detecting means such that said low-resolution position detecting means and said high resolution position detection means are combined with each other to precisely detect the positions of the pattern elements.

*b1
cont.*

2. (Amended) The image forming device according to claim 1 wherein, for each head, said test pattern is at least one vertical bar extending in the sub-scanning direction substantially perpendicular to said main scanning direction.

3. (Amended) The image forming device according to claim 1, wherein said test pattern includes, for each head and as a pattern element, at least one horizontal bar extending substantially in parallel with said main scanning direction, further comprising:

conveyance amount detecting means for detecting a conveyance amount of the print paper in the sub-scanning direction substantially perpendicular to said main scanning direction; and

measuring means for measuring the conveyance amount equal to or smaller than a minimum unit determined by a resolution of said conveyance amount detecting means,

wherein said calculating means moves the print paper, on which the test pattern is printed, with the use of said paper conveying means with respect to the carriage to detect the pattern elements of the test pattern with said pattern detecting means, detects the print position of the pattern elements based on the detection results of said conveyance amount detecting means and said measuring means when a rising and/or falling edge

B1
of the binary signal obtained by said binary conversion means is generated, and calculates an amount of mounting deviation of each head in said sub-scanning direction based on the print position of the pattern elements printed by each head.

B2
7. (Twice Amended) The image forming device according to claim 1 wherein said calculating means uses said pattern detecting means to detect the vertical bar in at least two positions in a longitudinal direction of said vertical bar to obtain a print position of said vertical bar based on an average value of the detected results.

9. (Amended) An image forming device that forms an image on a print paper in an ink jet recording method with a plurality of heads, comprising:

B3
main scanning direction moving means for moving a carriage in a main scanning direction, said carriage having said plurality of heads mounted thereon;

paper conveying means for conveying the print paper in a sub-scanning direction;

pattern printing means for printing, with at least one head, a test pattern including predetermined pattern elements;

pattern detecting means, mounted on said carriage, for detecting the pattern elements of the test pattern printed on the print paper by said printing means;

binary conversion means for binarizing an output of said pattern detecting means;

position detecting means for detecting a position of the carriage in said main scanning direction; and

B3
cancel

calculating means for moving said carriage to detect the pattern elements of the test pattern with said pattern detecting means, for detecting a print position of the pattern elements based on a detection result of said position detecting means when a rising and/or falling edge of a binary signal obtained by said binary conversion means is generated, and for calculating a mounting deviation amount of each head in said main scanning direction,

wherein, for each head, said test pattern includes as a pattern element at least one vertical bar extending in the sub-scanning direction substantially perpendicular to said main scanning direction, and

wherein said pattern printing means divides said vertical bar into a plurality of portions and causes each of different portions of a single head to print a plurality of dots sequentially in a plurality of passes, said plurality of dots constituting a portion of said vertical bar.

Swc
Bx

11. (Amended) A method, for use on an image forming device with a linear scale provided on a carriage movement path, for detecting a deviation between a print position actually printed on a print paper by a head and a print target position, said method comprising the steps of:

providing a timer for detecting a position within a unit interval determined by a resolution of said linear scale;

printing a predetermined print element at the target position on the print paper by the head mounted on a carriage that scans in a main scanning direction;

detecting said print element with a sensor mounted on said carriage;

detecting a low-resolution position based on said linear scale when the print element is detected and, detecting a high-resolution position within the unit interval with said timer, by combining said low-resolution position with said high-resolution position; and

obtaining the deviation between the detected position and said print target position.

16. (Amended) The image forming device according to claim 6 wherein said calculating means uses said pattern detecting means to detect the vertical bar in at least two positions in a longitudinal direction of said vertical bar to obtain a print position of said vertical bar based on an average value of the detected results.

REMARKS

Reconsideration is respectfully requested.

Claims 1-17 are pending in this application. Claims 1, 2, 3, 7, 9, 11 and 16 are amended.

Claims 7 and 16 are objected to related to syntax informalities. These claims have been amended herein. Applicant thanks the Examiner for suggesting appropriate wording to resolve